NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**APPLYING HUMAN CAPITAL MANAGEMENT TO
MODEL MANPOWER READINESS:
A CONCEPTUAL FRAMEWORK**

by

Pert Chin Ngin

December 2005

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REPORT DOCUMENTATION PAGE			*Form Approved OMB No. 0704-0188*
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.			
1. AGENCY USE ONLY (*Leave blank*)	**2. REPORT DATE** December 2005	**3. REPORT TYPE AND DATES COVERED** Master's Thesis	
4. TITLE AND SUBTITLE: Applying Human Capital Management to Model Manpower Readiness: A Conceptual Framework			**5. FUNDING NUMBERS**
6. AUTHOR(S) Pert Chin Ngin			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			**12b. DISTRIBUTION CODE**
13. ABSTRACT (maximum 200 words) The United States Navy is currently going through a human capital transformation in order to better meet the security challenges of the 21st century. A key component of the plan is the job analysis process, conducted using the SkillsNET methodology, to define job requirements in terms of knowledge, skills, abilities, and tools, in contrast to the current approach of relying on the rating badge and a naval enlisted code associated with the billet. The objective of this thesis is to develop a new metric to present manpower readiness in terms of human capital readiness, in line with the Navy's new human capital management approach. This thesis reviews human capital management theories and Sea Warrior, focusing on the capture of human capital skill objects by SkillsNET. Manpower readiness is defined as a function of two components: competence level and preparedness level. Competence level represents the current level of readiness, while the preparedness level is a proxy for the level of readiness in the immediate future. The proposed metric utilizes the human capital skill objects compiled and defined by SkillsNET, and aggregates the individual data to generate the overview of human capital readiness at functional or organizational levels. This metric can be used as a performance measure to evaluate the effectiveness of activities and initiatives conducted in human capital management, which ranges from planning, recruiting, and training to assigning.			
14. SUBJECT TERMS Human Capital, Human Capital Management, Skills Management, Readiness, Personnel Readiness, Manpower Readiness, Military Labor Market			**15. NUMBER OF PAGES** 63
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UL

i

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READINESS: A CONCEPTUAL FRAMEWORK**

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

**NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

The United States Navy is currently going through a human capital transformation in order to better meet the security challenges of the 21st century. A key component of the plan is the job analysis process, conducted using the SkillsNET methodology, to define job requirements in terms of knowledge, skills, abilities, and tools, in contrast to the current approach of relying on the rating badge and a naval enlisted code associated with the billet.

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ACKNOWLEDGMENTS

I would like to thank the following people for their support of this thesis:

Dr. Bill Gates and CDR(Ret) Bill Hatch who have constantly shown immense confidence in me, in addition to guiding me and providing me with invaluable insights to personnel management in the United States Navy.

CDR Sue Bosque, for all the kind assistance in obtaining access to invaluable information critical to this thesis.

My wife, Melanie, for all the encouragement and for doing all the work at home while I focused on the thesis.

My daughter, Vera, for understanding that I had a mission to accomplish and providing the welcomed distractions when I needed a break.

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I. INTRODUCTION

A. BACKGROUND

1. Human Resources as an Asset

Over the last ten years, management of organizations has begun to recognize human resources as one of the most important levers for sustainable competitive advantage. In a world where knowledge and connections to customers matter more and more, human capital, which represents a company's stock of knowledge, technical skills, creativity, and experience, is becoming increasingly important and correspondingly, the workforce is seen as the productive assets of an organization, rather than as an expense.

In order to conceptualize the workforce as a stock of human capital, it is important to understand the economist's concept of "stock" and "flow". Human capital represents the stock of human assets that generates the flow of labor services to the firm. This is akin to the concept of wealth and income. Human capital is the equivalent of the accumulated human "wealth" of an organization and labor productivity is in effect the income generated from that wealth (Nalbantian, Guzzo, Kieffer, and Doherty, 2004). Organizations will invest their resources to acquire, develop, and enhance their stock human capital with the aim of generating an increase in productivity and corresponding increase in income.

Extending from the concept of human capital as a productive asset, human capital management is an asset management framework for securing, managing, and motivating a workforce capable of achieving business goals. The science of human capital management incorporates research in microeconomics, organizational psychology and new statistical methods and information systems, making it possible for executives to identify and understand the real human capital drivers of business performance. By measuring these human capital drivers of business performance, decision makers can predict the impact of their choices involving human capital on future results with reasonable confidence.

So, how can human capital management be applied to military organizations? This is one of the primary research questions that this thesis will discuss. However, prior

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to that, it is important that we understand the significant changes in the environment affecting military organizations in the 21st century.

2. The Military Environment

With the ongoing global war on terror, the spectrum of operations required of military forces has been expanded significantly, while in contrast, the response time to react to contingencies has been reduced tremendously. The combined effect of these two factors demand that military organizations achieve greater flexibility in deployment and higher levels of readiness.

> The demands of the 21st Century security environment are markedly different from those that shaped the manpower requirements and personnel systems and policies that are used in the [Defense] Department today. The current set of human resources policies and practices will not meet the needs of the 21st Century if left unchanged. (The Defense Science Board Task Force on Human Resources Strategy, February 2000)

In order to meet the demands of the 21st century security environment, military organizations need to fundamentally change the way human resources are managed. The first step is to recognize the workforce as a productive asset that affects the productivity of all other physical assets. This highlights the need for military organizations to have detailed knowledge of workforce qualities and characteristics, and how these are linked to overall mission readiness.

In addition to the challenge to achieve and maintain a high state of readiness to accomplish a wide range of operations at the most economical cost to the taxpayers, today's military forces also face a wide range of other challenges from the environment. These challenges include budget constraints, the competition for skills and talents, and the impact of increasing technological complexity. Budget constraints are not new to military organizations where the objective is always to do more with less. The challenge is to invest the allocated budget optimally to maximize the returns from the investments. The other challenge is in competing with commercial firms for skills and talents. The increasing technological complexity in state-of-the-art weapon systems places even more demands on the quality of the workforce.

B.   OBJECTIVES

The primary objective of this thesis is to revolutionize the way military organizations model manpower readiness by incorporating human capital management. This thesis utilizes the preliminary job information of the United States Navy, gathered by SkillsNET Corporation, to develop a conceptual framework for a human capital based manpower readiness model. The aim of the model is to provide a performance measure for military organizations to evaluate their strategic decisions, policies, interventions and human resource management functions, based on the effect on their stock of human capital.

C.   RESEARCH QUESTIONS

The following research questions are addressed in this thesis:

1.   How can organizations make the paradigm shift from personnel management to human capital management?

2.   How can human capital be quantified and measured?

3.   How can military organizations, using the United States Navy as an example, use human capital management to model manpower readiness?

4.   What are the uses for a human capital based manpower readiness model?

D.   ORGANIZATION OF THESIS

This thesis examines the concepts and theory behind human capital management, with the aim of developing a conceptual framework for a human capital based manpower readiness model for military organizations. The next chapter, Chapter II, starts by reviewing the background and developments in human capital theory. Chapter II also elaborates on the applications of the human capital theory to economics and human resource management, and concludes by discussing the different aspects of measuring human capital and its contributions.

The United States Navy has contracted SkillsNET Corporation to conduct the job analysis process which is currently in progress. Chapter III details the SkillsNET methodology and their proprietary SkillObjects^{TM} framework for organizing the job information gathered. Chapter IV summarizes the Navy's human capital transformation plan and the strategic goals that guide all the transformational efforts and initiatives.

Chapter V first discusses the concepts of military force readiness drawing on the work of Laura J. Junor and Jessica S. Oi (1996) that studies the drivers behind ship readiness. Then, using an example of the job information currently available online in the Navyskills Database, Chapter V describes the conceptual framework for deriving a manpower readiness index based on human capital. Chapter VI completes this thesis with conclusions and recommendations.

II.   HUMAN CAPITAL THEORY

A.   BACKGROUND

Traditional microeconomics assumes labor as a homogeneous input to the production function that is measured by headcount or number of labor hours.   The introduction of human capital theory enabled economists to incorporate the heterogeneity of labor, as reflected by differences in demographics, education and experiences, into the core of microeconomic theory.

The term "human capital" conceptualizes workers as a body of skills and knowledge that can be "rented out" to employers.   This body of skills and knowledge comes from education and training, which is enhanced and built upon by learning from work experience, and generates the stock of human capital.

B.   THE THEORY APPLIED IN MICROECONOMICS

The human capital theory was first put forth by Theodore Schultz[1] in 1963 to explain the relationship between individual investments in education and training, and income differentials.   The theory assumes that the individual is rational and methodical, and seeks to maximize his lifetime earnings by making individual decisions to invest his resources in education.   The theory also assumes a causal link between education, productivity and increases in earnings.   Essentially, human capital theory assumes that the stock of human capital is directly correlated to productivity, i.e, increases in the stock enhances productivity, and the individual worker is compensated for increases in productivity.   Since investments in education and training are direct avenues to increasing the stock of human capital, the individual will make investment decisions by comparing the costs of those investments to the present value of the increase in income stream they produce.   Investments will be undertaken if the present value exceeds the associated costs and the rate of return is greater than that from other available alternatives.

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[1] Theodore Schultz, The Economic Value of Education, *New York: Columbia University Press*, 1963.

Jacob Mincer[2] (1958) and Gary Becker[3] (1964), associates of Schultz, extended the human capital approach significantly when they incorporated the provision of training. Specifically, they introduced the fundamental distinction between the provision of general and specific training by the employer. General training refers to non-specific generic training that builds skills which are portable from one employer to another. This form of training is clearly desirable for the employee because it enhances his stock as well as his mobility. Employers need workers who have either received the desired general training from another employer, or will receive it from themselves. For the former, employers are willing to offer better employment terms to attract them. For the later, however, the general training is financed by reduced earnings during the training and contractually obligated periods. Subsequently, the employer will need to offer improved terms to match other potential employers to retain the services of their trained employee. Employers can also offer general training as a recruitment tool. Specific training, on the other hand, refers to specialized skills training that provides employees the skills which the employer requires for the firm's unique operations. Employers will provide this form of training to the extent that productivity is enhanced.

The combined work of Schultz, Becker and Mincer is used to explain a variety of labor market phenomena, including income differences across individuals, the trajectory of earnings over an individual's work life, investments in education and on-the-job training and their respective returns, as well as patterns of occupational and job mobility and the duration of employment.

Following the specification of the human capital model, complementary theories of "job matching", "job search" and "signaling" were published to explain how the labor market works to match workers with varying stocks of human capital to jobs and organizations. The theories of "signaling" and "screening" are essentially similar in that they do not assume the causal link between education and productivity. The theories rationalize investments in education from the perspective of the worker and the employer

[2] Jacob Mincer, "Investment in Human Capital and Personal Income Distribution", *Journal of Political Economy*, 1958, 66(4):281-301.

[3] Gary Becker, Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education, *New York: National Bureau of Economic Research*, 1964.

respectively. Both theories are assessed to be relevant to this thesis and will be discussed here.

1.   The Theory of Signaling: Worker's Perspective

Arising from the inability of economists to accurately specify the education production function, the theory of signaling proposes that education is a signal from workers to employers of their underlying qualities or capabilities. Since the costs of investments in education, which includes psychic costs, varies from one individual to another, depending on his or her abilities, the theory assumes that the costs of investments in education for the worker are negatively related to his or her on-the-job productivity. In other words, individuals with a higher level of ability tend to have a lower cost of education and therefore will be more productive. Individuals invest in education to acquire the education signal for the employer.

2.   The Theory of Screening: Employer's Perspective

Since the individual has different qualities and most job skills are acquired on the job, either through specific training or through work experience, the employer will attempt to differentiate potential recruits by their trainability and adaptability. According to the screening theory, successful completion of a certain level of education serves as a "signal" to the employer of the presence of personality attributes, such as ability, motivation and willingness to learn, which are predictors of trainability. Hence, the employer will attempt to identify the correct recruit through screening techniques that focus on academic qualifications, assuming that the individual will be able to learn from his work experience and firm-specific training as well as he has done academically. This theory explains the firms' preference for better educated employees and consequently the correlation between pay and education qualifications.

3.   Understanding and Applying the Theories

The two theories of signaling and screening highlight the significance of the link between education and productivity to the human capital theory. As a manager of human resources, it is prudent to take a more moderate approach towards understanding and applying the theories. It is inconceivable that education does not enhance the stock of human capital. It is also logical to assume that education provides a foundation stock of human capital, which further training and work experience will enhance. The strength of

this foundation will denote the individual's trainability and adaptability, and reasonably predict his or her contribution to the employer. For the above reasons, it is safe to conclude that education enhances the stock of human capital, and signals trainability to potential employers. The application of the human capital theory in management will be discussed in greater detail in the following section.

C.   THE THEORY APPLIED IN HUMAN RESOURCE MANAGEMENT

Extending from the definitions of general and specific training, the stock of human capital generated by training is characterized by a corresponding mixture of generalized and firm-specific human capital. It is the manager's job to decide the optimal balance of generalized versus firm-specific human capital for the organization.

Generalized human capital commonly refers to attributes and credentials developed through education, which reflects the quality of the employee and generic skills acquired through general training. This form of human capital is deemed valuable to both the current employer as well as potential employers. On the other hand, firm-specific human capital refers to specialized knowledge, skills, and abilities, which are of unique value to their employer and build up through targeted training or experience.

When applying human capital theory to human resource management, it is important to recognize that human capital in organizations represents the stock of human assets, which consists of the accumulated knowledge, skills, experience, creativity and other relevant workforce attributes, that provides the flow of labor services to the organization. Human capital is the productivity potential of the workforce, and labor productivity is the income generated by it. Hence, the return on organizational investments in training can be measured in terms of the increases in the flow of labor services.

Fundamentally, similar to any stockpile of resources, the stock of human capital can be described by two parameters: (1) the overall level or value, and (2) the composition of the stock. Both of these parameters depend on the individual's prior investments in education, which represents the foundation stock of human capital and signals his or her trainability as discussed in the earlier section, and the individual's and organization's subsequent investment decisions in training.

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Conceptually, different jobs in an organization will require different knowledge and skills. There will also be generic knowledge and skills that may be similar across different jobs. These requirements represent the level of human capital that is needed. The value of this stock of human capital will depend on how much other firms value the generalized human capital and how much the firm itself values the firm-specific human capital. At the organizational level, the overall level and value of human capital will be represented by the sum of the individual stocks of human capital that reside with each employee. When making resource allocation decisions, it is important to recognize the overall level is not as useful as the comparison between the job requirements and individual stocks in determining where the excesses and shortages lie. Grouping jobs with similar requirements or by areas of specialization will facilitate the allocation of resources for training at the strategic level.

The composition and balance of generalized versus firm-specific human capital in the stock depends on the human capital investment decisions made by the individual and the firm with regards to when, where and what to invest in training. At this juncture, it is appropriate to introduce the theory of internal labor markets to this discussion.

The concept of internal labor markets was first mentioned by Clark Kerr[4] (1954). Peter Doeringer and Michael Piore[5] (1971) then defined the internal labor market as an administrative unit within which the pricing and allocation of labor is governed by a set of rules and procedures. Job seeking workers join the firm at the entry level and move laterally or upwardly along distinct job ladders as they acquire specific training and gain experience. Other characteristics of internal labor markets include job security governed by well-defined procedures and company norms and typically on-the-job and firm-specific training (Osterman, 1982). The military is often cited as one of the best examples of an internal labor market.

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[4] Kerr, Clark, The Balkanization of Labor Markets, Labor Mobility and Economic Opportunity, *Cambridge*, *MA: MIT Press*, pp. 92-110, 1954

[5] Doeringer, Peter, and Piore, MichaelJ., Internal Labor Markets and Manpower Analysis, *Lexington*, *MA: Health*, 1971.

When we bring together the theories of human capital and internal labor markets, it becomes obvious that the features of an internal labor market will have significant implications on the optimal balance of generalized versus firm-specific human capital. Organizations with an internal labor market need to develop screening tools to identify trainability in their potential employees, so as to maximize the returns from their subsequent investments in firm-specific training. These organizations also generally require a higher level of firm-specific capital; thus, training and experiential learning will be important. Furthermore, because human capital in these organizations is largely firm-specific and developed in-house, the ability to optimally allocate this human capital is critical to the success of these organizations.

Since the development of firm-specific human capital makes separation more costly for both the employee and the employer, the balance of general and firm-specific human capital achieved by employees has direct implications for the expected relationships between employee tenure and remuneration. Human capital theory provides a road map for understanding those relationships and the ways labor markets value the different types of human capital.

The new science of human capital management has been made possible by three major developments: (1) advances in knowledge about human capital and its links to organizational performance derived from growing academic research in the combined fields of labor economics and organizational psychology, (2) the emergence of modern information systems, such as Enterprise Resource Planning (ERP) systems, that make employee data and all forms of financial, operational, and customer data readily accessible for real-time analysis and tracking, and (3) advances in and technological applications of modern statistical methods that allow practitioners and researchers to tap those data far more quickly and effectively to inform decision making (Nalbantian, Guzzo, Kieffer, and Doherty, 2004).

D.   HUMAN CAPITAL MEASUREMENT

The essence of the human capital management requires organizations to regard the stock of knowledge and skills residing with their employees as assets, and any actions taken to acquire or enhance that stock as investments. In order to manage investments in human capital effectively, organizations need to develop tools and metrics to monitor and measure the returns from these investments. The Balanced Scorecard by Kaplan and Norton[6] (1996) is credited as being the first to incorporate non-financial measures such as employee learning and growth, with standard financial accounting, into business performance measurement. The primary differentiator is that the balanced scorecard is based on organizational strategy (Kaplan & Norton, 1996).

1.   Measures for Current Peformance

According to Fitz-enz[7] (2000), there are three levels at which the leverage of human capital investment can be measured: enterprise, business unit and human capital management. And macro-level data is the launching site of a return on investment (ROI) assessment system.   Fitz-enz (2000) suggested an enterprise-wide human capital scorecard including two main sections: financial and human. Collectively, a human capital enterprise scorecard template will provide top management with a ruler to measure functional unit performance.   Examples of the proposed enterprise-level financial measures and human measures are compiled in Figure 1. In addition to these, other categories of indicators can be added to measure learning and growth in employees, and costs and returns on investments in workforce development.

Figure 1.   Sample corporate human capital scorecard (From Fitz-enz, Jac, The ROI of Human Capital, AMACOM, 2000)

Financial	*Human*
Human Capital Revenue	Exempt Percentage
Revenue divided FTEs*	*Number of exempt FTEs as a percentage of total FTEs*
Human Capital Cost	Contingent Percentage
Cost of pay, benefits, absence, turnover, and contingents	*Number of contingent FTEs as a percentage of total FTEs*

6 Kaplan, Robert S., and Norton, David P., The Balanced Scorecard, *Cambridge*, *Mass.: Harvard Business Press*, 1996.

7 Fitz-enz, Jac, *The ROI of Human Capital*, AMACOM, 2000.

Financial	*Human*
Human Capital ROI	Accession Rate
Revenue minus (expense minus total labor cost), divided by total labor cost	*Replacement hires and hires for new positions as a percentage of the workforce*
Human Capital Value Added	Separation (Loss) Rate
Revenue minus (expense minus total labor cost), divided by FTEs	*Voluntary and involuntary separations as a percentage of headcount*
Human Economic Value Added	Total Labor Cost Revenue Percentage
Net operating profit after tax minus cost of capital, divided by FTEs	*All labor costs as a percentage of total revenue*
Human Capital Market value	Employee Development Investment
Market value minus book value, divided by FTEs	*Costs of all training and development as a percentage of payroll*

*FTE: Full Time Equivalent

At the enterprise level, the key is to identify the relationship between human capital and enterprise goals. At the business unit (or functional) level, measurement metrics should capture and assess changes in levels of service, quality, and productivity outcomes. These changes can be measured through a combination of cost, time, volume, errors or defects, and human reactions like complaints or compliments. The third, or primary, level measurement indicators should quantify the effects of the organization's human resources management systems.

Measurement of the return on human capital starts by understanding the tasks involved with managing human capital from the workforce planning stage onward (Fitz-enz, 2000). The human capital managing activities are similar to the typical human resource function: workforce planning, recruiting, deploying, evaluating, training and developing, retaining, and exiting. Fitz-enz (2000) summarized the human capital management activities into the human capital management star shown in Figure 2.

Figure 2.   Human Capital Management Star (From Fitz-enz, Jac, The ROI of Human Capital, AMACOM, 2000)

Planning

Retaining   Acquiring

Evaluating

Developing   Maintaining
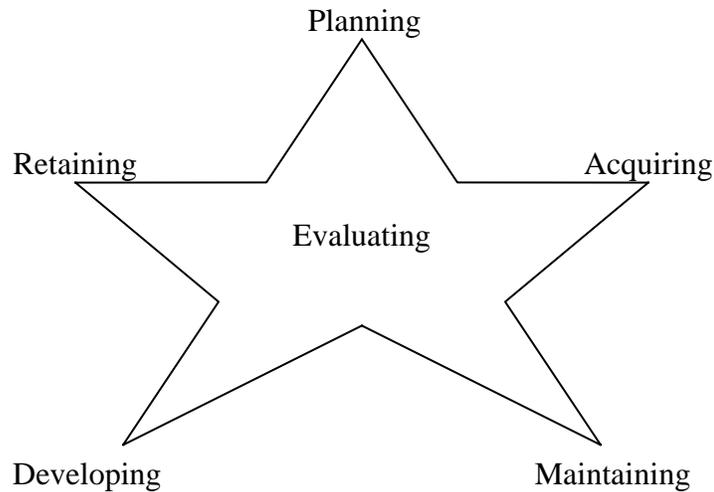
2.   Predictors for Future Performance

Fitz-enz (2000) proposed a series of six functional level leading indicators to monitor the overall well-being of an organization's workforce. These indicators focus on the characteristics of the workforce and are also valid predictors for the future performance based on the current stock of human capital. The metrics, summarized in Figure 3 below, cover areas such as preparedness, competence, job satisfaction, commitment and depletion.

Figure 3.   Leading Indicators (From Fitz-enz, Jac, The ROI of Human Capital, AMACOM, 2000)

Human Capital Competence Level
Percentage of key employees who have met competence standards

Human Capital Readiness Level
Percentage of key positions with at least one fully qualified person ready

Human Capital Commitment Level
Percentage of employees expecting to stay at least three years

Human Capital Satisfaction Level
Percentage of employees scoring in top quartile of job satisfaction survey

Corporate Climate
Percentage of employees who indicate concern with culture and climate

Human Capital Depletion Rate and Cost
Voluntary separations as a percentage of head count and the cost of separations

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Of particular interest to this thesis are the two measures of preparedness: competence and readiness. The competence level is simply the percentage of people who have demonstrated the skill and knowledge that make them able to meet current and near-term future performance requirements in their current jobs.

The concept of competence sprang from David McClellan's pioneering work for the United States Information Office in the early 1970s to identify the critical competencies for the successful performance of a field service information officer, which was a position that functioned in a wide variety of geographic, political, and ethnic settings around the world. He accomplished the task by focusing on the person in the job rather than on background factors, such as education or aptitude test scores. He provided the first standardized definition of the term "competency" as an underlying characteristic of an individual that is causally related to criterion-referenced effective or superior performance in a job or situation.

Criterion-referenced means that a given competency is able to predict behavior and performance. This is pertinent when selecting and developing people for jobs in organizations. Extending from human capital theory, by identifying the competencies required for jobs, one can evaluate the incumbents' stock of human capital to determine the degree of fit between the incumbents' stock and job requirements. The job required competencies and human capital can both be expressed in terms of knowledge, skills and abilities (KSAs). From this, desired target levels can be established and tracked. From this metric, the organization will be able to assess where they stand today and how well they are prepared for the immediate future. The required job competencies should not change materially as long as there is no drastic change in the character of a job.

The competencies are also precursors and requirements for the next level of preparedness measurements, which is bench strength or succession. This is known as the readiness level. This is the percentage of key positions with at least one fully qualified (competent) person ready to take over now, or alternatively the percentage of people who have demonstrated their capability to step into a position above them on short notice. Applying the readiness criterion to all key positions yields a picture of the organization's general human capital health. Organizations with people capable of stepping in and taking over at a moment's notice, will probably experience fewer slowdowns in the event of unforeseen emergencies. This is especially critical for key talent in an organization, that may decide to leave or may have to be transferred to support another initiative. This cadre of qualified personnel can also be mobilized quickly for problem solving, team projects, or new market opportunities. However, maintaining a high level of human capital readiness can be costly because it may imply excesses in the form of unproductive human capital. Hence, organizations need to balance high readiness versus costs.

The common prerequisite for these two preparedness measures, competence and readiness, to be effective is the clear description of the required KSAs for each job. Once the organization is able to detail its requirements, it should be relatively simple to assess how close the incumbents are to attaining them. The combined effect of these two measures will highlight areas of shortfalls and excesses in the organization's stock of human capital at the functional level, currently as well as in the future.

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III.   THE SKILLSNET JOB ANALYSIS PROCESS

A.   INTRODUCTION

The ability to identify and measure workforce capabilities, and subsequently use the resultant information as management tools, is the foundation of human capital management.   The detailed awareness of the knowledge, skills, abilities and other characteristics (KSAOs) required of the workforce to accomplish an organization's mission, will enable the organization to tailor the workforce, through human resource management activities, to meet those mission requirements.   The starting point to this human capital management approach is the job analysis, which is the process to gather this vital KSAO information about jobs in an organization.

B.   JOB ANALYSIS PROCESS

Job analysis consists of a systematic set of procedures or methods for determining what workers actually do in their job and for describing which aspects of worker knowledge, skills, abilities, and other characteristics contribute to job performance (Strange, Sandall and Brown, 2003).   Through the information gathered in this process, organizations can rationalize the work being done and their strategic mission, and begin to streamline and synergize.   Building on this, organizations can move on to acquire or develop the workforce to obtain the KSAOs required for mission success.

1.   Approaches to Job Analysis

Despite the many different approaches to job analysis, fundamentally, a job analysis will have the following actions: (1) gather job relevant information from current documentation, (2) utilize job incumbents to clarify perceptions about the job, (3) identify important job dimensions, (4) observe and scrutinize the job being performed, and (5) develop a measure to assess various aspects of the job.   There are two principal approaches to job analysis.   The inductive approach gathers new and specific task-oriented information, while the deductive approach uses existing knowledge of job information to collect work-oriented information.

The advantages of the inductive approach is developing a job analysis measure that is specific to the target job and has high content validity.   However, the level of detailed information implies that inductive job analyses are also costly and time-

consuming for the organization and the job incumbents, and the methods used are significantly more intrusive as compared to the deductive approach. In using existing job information, deductive job analyses use an already established common language across different job types, and hence are less time-consuming and less costly. Examples of job analysis tools and methods using the deductive approach include the Position Analysis Questionnaire (PAQ), Job Components Inventory, and the Management Position Description Questionnaire (MPDQ).

C. SKILLSNET PROCESS

1. Background

The SkillsNET method of job analysis is based on the Occupational Information Network, or O*Net, which was initially developed by the U.S. Department of Labor to serve as an online replacement for the Dictionary of Occupational Title (DOT). The O*Net developers adopted a comprehensive deductive approach by collecting task-oriented data, needed occupational knowledge, skills, abilities, and tools (KSATs) in addition to worker-oriented data like worker requirements, experience, and occupation, as well as worker characteristics. Assisted by information technology, using an electronic database and a questionnaire-type survey methodology, the developers collected an immense amount of information for every job in DOT and greatly expanded the kinds of job descriptors in the system.

According to Strange, Sandall and Brown (2003), the newly defined job descriptors of Generalized Work Activity (GWA), Skills, and Abilities are perhaps the developers' greatest contribution to the practice of job analysis. These descriptors are also significant enablers to human capital management. The forty-two GWAs enable organizations to aggregate similar job activities or behaviors that underlie the successful completion of major work functions into broad areas of work, such as "Getting information to do the job" or "Analyzing data or information". Worker characteristics, in terms of skills and abilities, allow organizations to classify information about jobs in a way that links the characteristics of the job tasks with the skills and abilities necessary to perform them. Skills are defined as the person's level of proficiency or competency to perform a task, and consist of forty-six constructs such as "Reading comprehension" and "Product inspection". The fifty-two identified abilities are defined as a person's enduring

capacities for performing a wide range of different tasks, and consist of constructs such as "Deductive reasoning" and "Spatial orientation". The identification of the O*Net GWAs, Skills and Abilities provided the framework, as well as the job information, for organizations to effectively analyze jobs and take the first steps in human capital management.

2. SkillsNET and SKillObjects^{TM}

The two principal components of the SkillsNET method of job analysis are the SkillsNET job data collection process and the SkillObjects^{TM} job classification system. The SkillsNET job data collection process incorporates concepts from O*Net and is designed to combine the advantages of both the deductive and inductive approaches to job analysis. To reduce the time and costs involved for the inductive approach, the SkillsNET method uses existing job information and an online format to help job incumbents generate new task data. The information is validated by other co-workers and aggregated to eliminate possible biases and provide a more comprehensive picture.

The SkillsNET job analysis process centers on workers who perform the work. Job data is collected through a series of online applications that collect task, tool, and unique knowledge information, validate this information, link tasks to enabling O*Net skills and/or abilities, establish Critical Work Functions, collect survey data from job incumbents, and classify all of the collected information (Sandall and Brown, 2003). SkillsNET defines Critical Work Functions as major responsibilities that an individual must fulfill to achieve the work required for the job or role that enables mission accomplishment.

To begin, job incumbents fill out pre-designed online templates that lead them to think critically about their work. The templates utilize O*Net's GWAs as a cueing technique, starting with broad descriptions of the work, and gradually guide the worker to narrow down, to develop a comprehensive list of tasks, tools, knowledge, skills, and abilities. The list is then evaluated, surveyed, and rated on as many as twenty rating scales, including frequency, training time, importance, and probability of error, by other co-workers. The completed information is classified into SkillObjects^{TM}, which logically group tasks performed, trained, or evaluated together and the skills and/or abilities, tools

and unique knowledge that are necessary to perform them.   The SkillsNET job analysis process is depicted in Figures 7 and 8 below.

Figure 4 below illustrates the build up from the daily process level to the generalized level of critical work functions. From bottom up, at the process level, the performance criteria is based on the knowledge, skills, abilities, and tools (KSAT) necessary to meet daily job task requirements. One or more KSAT may be required to perform a job task, and a particular KSAT may be required for a variety of job tasks. When aggregated, the KSAT represents the worker's overall capacity to perform the tasks. Related job tasks are identified and grouped together as SkillObjects[TM], and one or more SkillObjects[TM] may be required in a critical work function.

Figure 4.   The SkillObject Taxonomy (From SkillsNET)
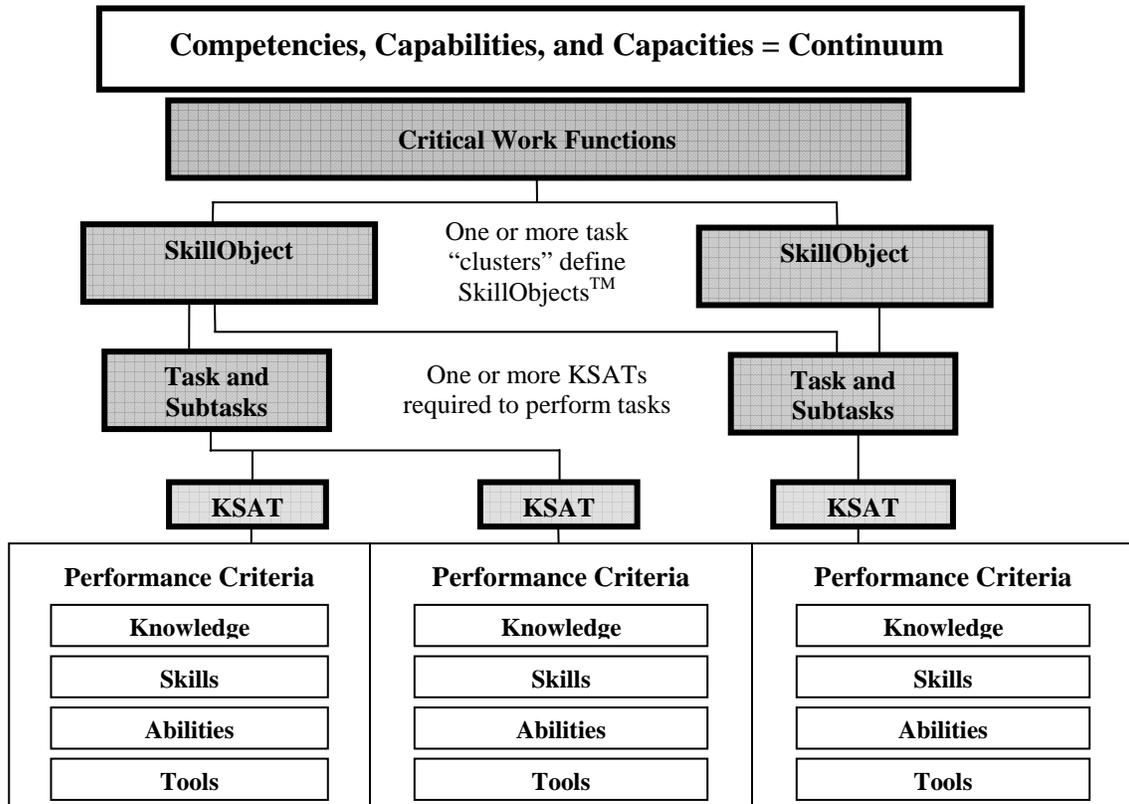
The SkillObjects[TM] job classification system applies the O*Net taxonomy to transform workforce information into knowledge by capturing work, worker, and workplace characteristics and their relationships to performance. SkillObjects[TM] uses the O*Net descriptors for skills and abilities, and provides a valid framework to define unique tasks, tools and knowledge requirements to perform Critical Work Functions.

Figure 5.   SkillsNET Architecture (From Brief to Fleet Readiness Planning Session, SkillsNET, February, 2005)
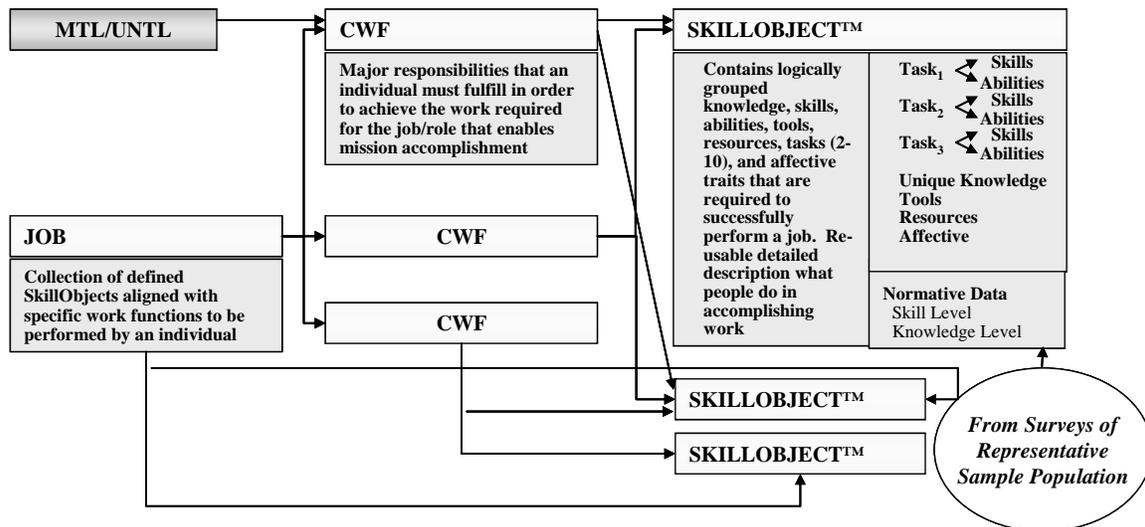
Figure 5 above maps out the SkillsNET architecture and better illustrates the linkages between the jobs, critical work functions and SkillObjects[TM]. As discussed in earlier paragraphs, critical work functions may include one or more related jobs, and require the corresponding range of SkillObjects[TM] to be accomplished. Critical work functions will highlight, to management, the important areas where the quality and composition of human capital will have significant impacts on mission accomplishment. This knowledge will enable management to make targeted strategic human capital investments and better measure the returns on human capital investments.

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IV.   THE NAVY'S HUMAN CAPITAL TRANSFORMATION

A.   BACKGROUND

In June 2002, former Chief Naval Operations (CNO) ADM Vern Clark published "Sea Power 21" – his vision of a new United States Navy to meet the security challenges of the 21st century. Since then, the Navy has earnestly embarked on their journey of transformation. Sea Warrior is the cornerstone of Sea Power 21. It outlines the human capital strategy to build a workforce capable of meeting the requirements of Sea Power 21. Figure 6 below maps out the essential aspects of the Navy's human capital transformation.

Figure 6.   Human Capital Transformation: Key to Achieving Naval Power 21. (From Department of Navy Human Capital Strategy, June 2004)
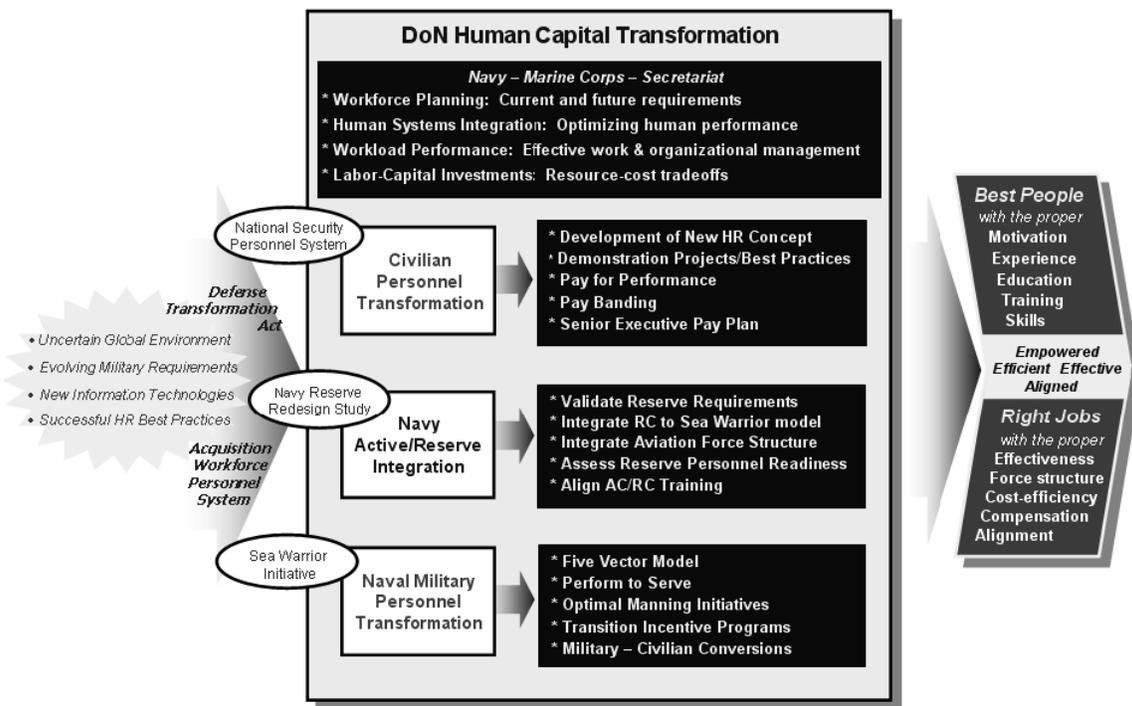
B.   STRATEGIC GOALS

The strategic goals of the Navy's human capital transformation detail the requirements for Sea Warrior and drive the capability developments. As outlined in the Department of Navy Human Capital Strategy (2004), the strategic goals can be grouped into two broad categories, people-focused and system-focused.

1.　People-Focused Strategic Goals

Inspire, Develop and Compensate are the three key words used to describe the people-focused strategic goals. To inspire requires that all transformational activities undertaken continue to encourage selfless service and patriotism, the spiritual foundation for the Navy's warrior culture and warfighting spirit. The most important implication is that all human capital systems and processes need to empower each individual to make the fullest contribution to the Navy's mission. This empowerment would deepen personal commitment to mission accomplishment, and promote even greater contributions.

To develop is to recognize that an environment of lifelong learning and individual opportunity is needed to develop the invaluable stock of human capital residing in the Navy's people. Such a learning environment needs to be nurtured through comprehensive planning and managing of investments in training, education, and career/professional job opportunities. The emphasis is to grow individuals from the moment they are recruited, through a planned career roadmap of training and education that provides them with the tools they need to operate in an increasingly demanding and dynamic environment, and to achieve their fullest potential in pinnacle assignments such as master chiefs or flag officers. In addition, human system integration considerations need to be fully factored when developing equipment to ensure ease of use and precisely targeted training. The end result is a harmony of operation between the people and the systems that will greatly contribute to overall mission readiness.

An effective and efficient compensation system will be critical to the Navy's ability to compete successfully for talent, encourage and reward performance, and recognize contribution. To be effective, the Navy needs to move toward a job-based compensation system by tying individual compensation to individual contributions towards mission readiness. This is only possible if the Navy accurately identifies the individual's precise capabilities and matches them into well-articulated job requirements. Simultaneously, to be efficient and remain affordable, the Navy cannot rely on pay alone, but must recognize the utility in a range of rewards and benefits that people value, some of which may be intangible.

2.   Systems-Focused Strategic Goals

The systems-focused goals target what the human resource management systems need to deliver in the four main functions: recruiting, managing, force shaping and separating. In recruiting, the Navy needs a system or process capable of selecting the right individuals, with the right talent, skill, and quality, who are adaptable to changing requirements, versatile, and prepared for intellectual and personal growth.

An aligned and integrated human capital management system will be central to the Navy's administration of its total workforce, which is made up of active and reserve military, civilians, contractors and volunteers. The system will be driven by accurately determined mission requirements that are continuously being validated. The system will also employ information management tools to gather timely, accurate, relevant and comprehensive personnel information which will allow the Navy to better meet the needs of the people and the mission, and maximize the returns on all human capital investments.

Effective force shaping tools will provide the Navy with the necessary flexibility to cater to the wide range of career expectations and motivations of the total workforce. The combination of total workforce planning and the development of force shaping tools will provide an internally balanced and mission focused force.

Separating or retiring will be the final step of a Navy career. To meet the Navy's employment needs for different workforce components, occupations, skills, and career paths, the Navy will require an adaptable and supportive separation/retirement system that allows individuals to transit to their next career or move within components of the workforce at the right time and under fair terms.

C.   THE STRATEGY

The overarching goal of Sea Warrior is to integrate the Navy's manpower, personnel, and training and education organizations, active and reserve, into a single, efficient, information-rich human resource management system, to meet the strategic goals of the Navy's human capital transformation. The first steps to a competency-based human resource management approach are to develop a database of the knowledge, skills and ability (KSA) required for jobs and assess the KSAs of the naval work force. This

comprehensive knowledge of each individual and the tasks required to accomplish the mission will enable the Navy to determine whether military or civilian personnel are the best fit for a job and which individuals have the right mix of skills. Through the competency-based approach, the Navy will be able to develop a single business process for the range of human resource management functions, from recruiting, training, assigning, to retiring, and integrate present stovepiped systems by ensuring seamless handoffs between functions over a career.

Rear Adm. (Sel.) Scott Van Buskirk, commander of Task Force Total Force, outlined five guiding principles governing the Navy's human capital strategy. First, personnel components have to be considered an essential strategic element of the whole force. This is alignment to the total force. The second guideline is the focus on competencies. This will inject flexibility and improve the Navy's ability to meet capability demands. The third pillar is considering professional and personal growth to ensure an abundance of opportunities for acquiring new skills and creating the "hybrid sailor". Fourth, KSA indexing will better link achievement to reward, providing the backdrop to advancing a culture of performance-based incentives. The final guiding principle is creating an agile organization. The key to an agile organization lies in the adaptability of its workforce. Again, the competency-based approach is central to this capability.

The starting point of a human capital strategy is knowing precisely the organization's stock of human capital, expressed in terms of KSAs, and the requirements detailed in the same form. To obtain this invaluable human capital information, the Navy has partnered with SkillsNET to use their SkillObjects^{TM} job analysis process described in Chapter III.

V.   APPLYING HUMAN CAPITAL MANAGEMENT TO MODEL MANPOWER READINESS

A.   READINESS

Readiness is commonly used by military organizations as a measure of their ability to accomplish the assigned mission. Typically, military organizations draw on the level of readiness as the fundamental measure for performance, akin to the financial bottom-line in commercial firms. The objective of military organizations is to achieve and maintain the highest level of readiness within the government-allocated financial and manpower resources. The primary research question for this thesis is how to apply human capital management concepts to model manpower readiness. Traditionally, military organizations emphasize headcount and focus on the percentage of billets or jobs occupied as the principal component of manpower or personnel readiness.

1.   Ship Readiness Model and Personnel Quality Index (Junor and Oi, 1996[8])

In their 1996 study offering an empirical explanation of what drives readiness for ships, Junor and Oi found that personnel quality significantly affects readiness. Specifically, they reported that experienced, intelligent, motivated sailors significantly improve every dimension of readiness. Junor and Oi analyzed information from the Status of Resources and Training System (SORTS), in the four SORTS areas, namely personnel, supply, equipment, and training. They used the time a ship spends in C1[9] for that resource area as a measure of readiness. They depicted the linkages between personnel, training, equipment, and supply readiness in their interrelationship map shown in Figure 7.

Junor and Oi (1996) concluded that manning, or personnel quantity, and personnel quality are the only two variables that are significant in all resource areas. The relationship between manning and personnel readiness is definitional because SORTS evaluates personnel by comparing available personnel to required personnel in several

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[8] Junor, Laura J. and Oi, Jessica S., A New Approach to Modeling Ship Readiness, *Centre for Naval Analyses*, April 1996.

[9] SORTS scores each resource area in five grades ranging from most ready (C1) to least ready (C5) according to how ready it is.

categories. In other words, the SORTS personnel portion tracks how well a unit matches "faces to spaces", so higher manning should correspond to higher personnel readiness. However, there is no direct measure of personnel quality within SORTS, and as a result the relationship between personnel quality and SORTS is not well defined. To this end, Junor and Oi (1996) developed a personnel quality index (PQI), an index that summarizes five measures or proxies for crew quality, as an explanatory variable to their model.

Figure 7.　　　The Interrelationships Among Resource Areas (From Junor and Oi, 1996)
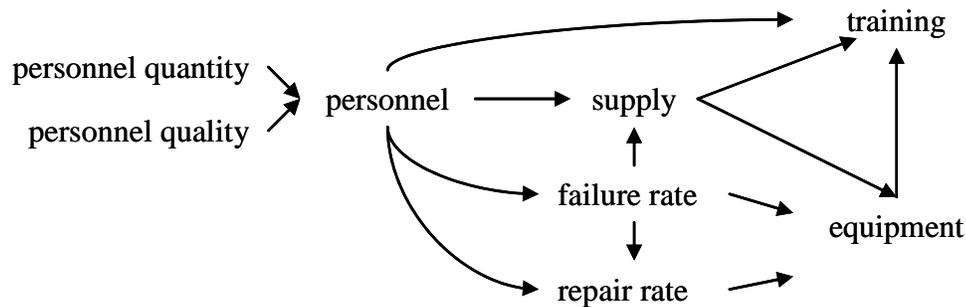
The PQI is generated based on five variables:

(1) percentage of crews with the traditional high school degrees,

(2) percentage of crews testing in the upper mental group[10] of the Armed Forces Qualification Test (AFQT),

(3) average length of service in months,

(4) percentage of crew demoted within a given quarter, and

(5) frequency of rapid advancements[11].

The first three variables should positively affect quality, while the remaining two are negative indicators that reflect reductions in crew quality. Junor and Oi (1996) stated clearly that personnel quality is not measured well by any of the above variables independently; rather personnel quality is a bundle of all these measures.

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[10] The upper mental group includes categories I, II and IIIA.

[11] This variable is calculated as a percentage of E5s and above with less than 4 years of experience. It is meant to proxy a lack of time in grade or the pain felt when a lot of senior enlisted leave and the Navy promotes to fill these vacancies.

2. Applying Human Capital Management to Readiness

The goal of human capital management is to acquire, develop, and manage manpower as productive assets so as to meet the organization's strategic goals. Knowledge, skills, abilities, culture, attitudes and processes will define the stock of human capital available to the organization. The four SORTS resource areas can be examined and elaborated from a different perspective under the human capital management approach. Personnel and equipment are the productive assets, while training and supply can be regarded as the avenues to generate and maintain these assets. Equipment encompasses all the physical and tangible assets of the organization, while personnel include all the intangible assets of the organization, and this is equivalent to the stock of human capital. A proposed readiness model for a military organization incorporating the human capital management approach is shown in Figure 8 below.

Figure 8.   Readiness Model
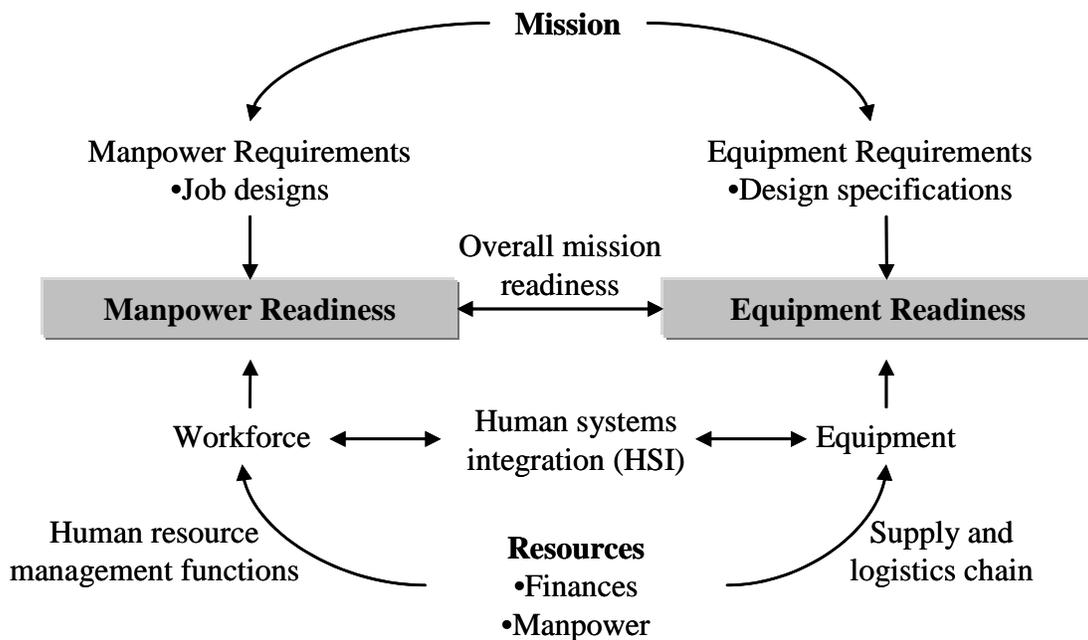
The mission of the military organization is translated into manpower and equipment requirements, defined in terms of job designs and design specifications, respectively. Manpower readiness measures the ability of the workforce to meet the manpower requirements. The responsibility of developing and maintaining a workforce capable of meeting the organization's requirements lies with the human resource management function. This is comparable to equipment readiness which measures the

supply and logistics chain's ability to provide and maintain the equipment essential to the mission. As established by Junor and Oi (1996) the overall mission readiness of the organization is a function of the interaction between manpower and equipment readiness. Junor and Oi (1996) also established that equipment readiness is significantly affected by personnel quantity and quality, which constitute manpower readiness. On the other hand, the availability of the correct and functional equipment will determine the workforce's ability to train effectively and develop the skills and abilities needed. In essence, the overall mission readiness of military forces depends on manpower readiness and equipment readiness.

B.   MANPOWER READINESS

Acknowledging the heterogeneity of the workforce is crucial to applying human capital management to model manpower readiness. This heterogeneity is reflected in the different knowledge, skills, abilities levels and attitudes of the workforce. So when applying human capital management to model manpower readiness, an important part would be matching up the stock of human capital to the job requirements.

If we re-examine the PQI variables from a human capital management perspective, we can see the relevance of the PQI as a measure of human capital. The first two variables are indicators of the stock of general human capital, but also indicate trainability and adaptability. The third variable, average length of service, indicates experience and reasonably estimates firm-specific human capital. The fifth variable, frequency of rapid advancements, represents the loss in productivity due to a lowered level of competency. However the PQI's inability to recognize the knowledge, skills and abilities of the crew leaves room for enhancement.

To apply human capital management to model personnel readiness, this thesis conceptualizes manpower readiness as a function of the stock of human capital in the organization and the job requirements. A human-capital-based manpower readiness index will function as a basis for an enterprise-wide return on investment assessment system, as well as a performance measure for all human resource management functions and activities for military organizations.

At the enterprise level, increases in the manpower readiness index can be used to evaluate the cost effectiveness of investments in training and personnel, which are the two principal accounts in the defense budget of military forces. Similarly, the index can also be used to assess the impact strategic interventions and policy changes have on the workforce. At the functional level, the manpower readiness index will be able to enhance the effectiveness of Junor and Oi's (1996) ship readiness model. Incorporating the manpower readiness index in place of the PQI can predict the impact changes in the stock of human capital have on overall ship readiness.

The manpower readiness index proposed by this thesis incorporates two important aspects of personnel readiness, namely human capital competency and human capital preparedness. This is shown in Figure 9 below.

Figure 9.   A Conceptual Framework for Manpower Readiness.

Manpower Readiness Index

Human Capital Competency Index
Reports the degree of fit between current stock of human capital and job requirements.

Human Capital Preparedness Index
Reports the bench strength of the organization, forecasts the degree of fit between the future stock of human capital and job requirements, and presents the overall psychological health of the organization's workforce.

1.   Human Capital Competency Index

The human capital competency index focuses on measuring the ability of the organization's current human capital stock to meet current job requirements. At the strategic level, this index reports the workforce's capacity to accomplish the mission, based on their current level of knowledge, skills and abilities.

The job analysis process generates detailed information on the knowledge, skills, abilities and other characteristics needed to fulfill the job requirements necessary to accomplish the organization's mission. The human capital competency index is based on this information and the corresponding workforce assessment that evaluates the workforce's human capital in accordance with the job analysis framework. Objective

measures need to be designed and developed to quantify the stock of human capital. Table 1 illustrates building the human capital competency index, based upon the expected output from SkillsNET's job analysis for the Navy. The example also adopts the SkillsNET architecture[12] of critical work functions and SkillObjects^{TM}.

Two factors, namely "weighting factor" and "proficiency required" have been included to calculate the relative importance of SkillObjects^{TM}, tasks, tools, unique knowledge and resources, both in accomplishing the work and on the level of competence required to complete the tasks and SkillObjects^{TM}, respectively.

The weighting factors are used to reflect relative importance, and therefore should sum up to one at each level. The relative importance should be a function of the amount of time the SkillObject^{TM}, task, tools, unique knowledge, and resources are required and an objective assessment of their criticality. Information on the amount of time spent or the amount of work effort devoted should be collected in the job analysis process. This information is based on the objective assessment of the job incumbents, reviewed and validated by co-workers and supervisors.

The proficiency required is an objective assessment of the level of competence necessary to adequately perform a job task or SkillObject^{TM}. Proficiency is also based on the opinion of job incumbents, reviewed and validated by co-workers and supervisors through the job analysis process. The levels of proficiency required could be presented on a fixed-point scale, where each point is clearly defined by the required knowledge, skills and abilities, training, and experience. The example presented in Table 1 and the following section assumes valid and well-defined five-point proficiency scales.

The proficiency scales for the required skills and abilities and for the component tasks are separately and objectively defined by job incumbents, co-workers and supervisors. The points on the proficiency scale of the component tasks are defined by considering training and experience in addition to the required proficiency level of the skills and abilities. The proficiency required should be progressive as jobs move up the organization ladder from apprentice, to journeyman, to master. As the workers progress from one level of the job to the next, the stock of human capital is built up through both

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experience gained on the job and training. A discussion on the workings of the two factors at two levels of the SkillsNET architecture follows.

a.   *Tasks, Tools, Unique Knowledge, and Resources*

A SkillObject^{TM} will consist of one or more task, tool, unique knowledge, and resource, which represents the stock of human capital required to perform it. The weighting factor can be used to represent the relative importance of task, tools, unique knowledge, and resources to the SkillObject^{TM}; however, this is not recommended as it would be akin to comparing apples and oranges. However, the weighting factor is applied to the components of the tasks, tools, unique knowledge, and resources to reflect the relative importance of the components. Subsequently, the proficiency required for the overall tasks is derived by summing the results of multiplying the weighting factors with the proficiency required of the component tasks. This calculation is used to derive the proficiency required for tools, unique knowledge, and resources as well.

Under the SkillsNET job information framework, the skills and abilities required to perform the tasks, such as management of material resources and written expression, are generic O*Net skills and abilities. This, in effect, also represents the element of general human capital. The firm-specific human capital element is represented by the unique knowledge component. The weighting factor is applied to the proficiency required to derive the overall proficiency required for the task and unique knowledge.

Tools and resources are the equipment that supports the worker in his work functions. The proficiency required for these should be a function of the required sophistication, presented on a fixed-point scale.

b.   *SkillObjects^{TM}*

According to the SkillsNET architecture, a critical work function may require one or more SkillObjects^{TM} or consist of one or more jobs. Similarly, jobs may require one or more SkillObjects^{TM}. The weighting factor at the SkillObjects^{TM} level is used to reflect the relative importance of a SkillObject^{TM} to the critical work function or the job, depending on the information desired. Hence the weighting factors for all the SkillObjects^{TM} of a critical work function or a job should sum up to one. The weighting

factors will enable the human capital competency index to account for the relative importance of the SkillObjects[TM].

The proficiency required for the SkillObject[TM] is the sum of the proficiencies required for the overall tasks, tools, unique knowledge, and resources. This sum of proficiencies reflects the job incumbent's readiness in the SkillObject[TM], when combined with the results obtained from a workforce assessment. The weighting factor is applied to the incumbent's readiness in the SkillObject[TM] when aggregating individual workers to derive the human capital competency index.

Table 1.   Example of the Build Up of the Human Capital Competency Index (Adapted from Integrated Data Assurance Process (iDAP) Online Skills Database at www.navyskills.net)

Center: *Aviation*   **Rating:**   *AC*
Job: *Air Traffic Controller*

Critical Work Function(s)				
SkillObject1			*Weighting Factor*	*Proficiency Required*
Air Traffic Control Supervision			**0.3**	**13**
Task Overall – (Task1+Task2)			--	*(0.5*4)+(0.5*2)=3*
Task1	Process aviation deviations and system errors		0.5	4[13]
	Skills	Information Organization	--	3
	Abilities	Written Expression	--	3
Task2	Manage air traffic control facility services		0.5	2
	Skills	Management of material resources	--	3
	Abilities	Deductive reasoning	--	3
Tools			--	*(0.5*3)+(0.5*3)=3*
	Computers		0.5	3
	Air traffic control bag		0.5	3
Unique Knowledge			--	*(0.5*4)+(0.5*4)=4*
	Trouble call procedures		0.5	4
	Aircrew administration procedures		0.5	4
Resources			--	*(0.5*3)+(0.5*3)=3*
	Facility manuals		0.5	3
	Air operations manuals		0.5	3

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[13] The proficiency level is defined by considering training and experience in addition to the proficiency required of the skills and abilities.

### c.	*Adding it up – Deriving the Human Capital Competency Index*

After the job analysis process, a workforce assessment will need to be carried out to measure the job incumbents' capabilities against the job information framework. The incumbent's proficiency for the component tasks is derived by summing the ratings for the required skills and abilities and comparing them to the required proficiency for tasks. The results from the assessment, representing the current stock of human capital, are matched up against the job requirements to derive the measure of incumbent's readiness. An example of the air traffic controller is shown in Table 2 below, assuming that only one SkillObject^{TM} is required for the job.

Table 2.	Example of Manpower Readiness Metric Incorporating Results from Workforce Assessment

Critical Work Function(s)					
SkillObject1		**Job Analysis**		**Workforce Assessment**	
		Weighting Factor	*Proficiency Required*	*Incumbent Proficiency*	*Incumbent Readiness*
Air Traffic Control Supervision		**0.3**	**13**	**12.7**	**12.7/13 = 97%**
Task Overall		**--**	**3**	*(0.5*4)+(0.5*1.3)=2.7*	*90%*
Task1		0.5	4	4	
	Skills	--	3	3	
	Abilities	--	3	3	
Task2		0.5	2	[(2+2)/(3+3)]*2=1.3	
	Skills	--	3	2	
	Abilities	--	3	2	
Tools		**--**	**3**	*(0.5*3)+(0.5*3)=3*	*100%*
	A	0.5	3	3	
	B	0.5	3	3	
Unique knowledge		**--**	**4**	*(0.5*4)+(0.5*4)=4*	*100%*
	C	0.5	4	4	
	D	0.5	4	4	
Resources		**--**	**3**	*(0.5*3)+(0.5*3)=3*	*100%*
	E	0.5	3	3	
	F	0.5	3	3	

Aggregating the individual job incumbent's readiness, from the example above, generates the human capital competency index for a functional grouping or organizational grouping. A functional grouping could be a grouping by critical work function or simply a grouping of identical jobs at the same level. The latter is used in the

example below to demonstrate the derivation of the human capital competency index. An organizational grouping would be an aggregate of a range of different jobs performing a variety of critical work functions, for example the ship, battle group or fleet.

Depending on the information desired, the human capital competency index can be compiled by aggregating the required SkillObjects^{TM} and individuals. For the example in Table 3 below, we have assumed that the Navy requires 200 air traffic controllers to fulfill its mission requirements. Under the current methodology of headcount versus billets, the personnel readiness is at ninety percent. On the other hand, the human capital competency index considers the different levels of individual competency and indicates the actual capacity of the air traffic controllers to accomplish the mission, based on headcount and their current stock of human capital.

Table 3. Example of Human Capital Competency Index for a Functional Group (Air Traffic Controller)

	Number	Incumbent Readiness	Current Methodology	Human Capital Competency Index
Air Traffic Controllers Required	**200**	**100%**	**100%**	**100%**
Current number on the job	**180**	**--**	**180/200 = 90%**	**177.1/200 = 88.6%**
Breakdown of Individual Readiness	*130*	*100%*		
	30	*97%*		
	20	*90%*		
Total Effective		*130*1 +30*0.97 +20*0.9*		
		177.1		

2. Human Capital Preparedness Index

Given the dynamic nature of the environment, a complete manpower readiness index should include a predictive measure to allow organizations time to acquire and develop a stock of human capital capable of meeting anticipated demands. The human capital preparedness index summarizes the health of the organization's human capital and predicts the future performance. A human capital preparedness index can be developed by applying the methodology of weighted requirements, similar to the human capital

competency index. Depending on the strategic intentions of the organization, management can decide on the weights to be applied when merging the four components to form the human capital preparedness index. The components of the index would include the following:

a.   *Projected Human Capital Competency Index*

A projected the human capital competency index matches forecasted human capital against projected job requirements in the near-term future, which can be defined as a fixed time frame (e.g. five years down the road) or based on the number of assignment cycles. The projected index will indicate the organization's ability to meet the mission requirements in the near future. The projected stock of human capital is formulated by progressing the current stock of human capital along a planned route of development and advancement, considering estimates for recruitment and attrition. On the other side of the equation, future job requirements can be projected through strategic planning exercises and workforce planning tools.

Such a measure of the workforce's predicted ability to accomplish the mission in the near future is especially important to military organizations because of their internal labor markets focus. The development of new equipment and strategies demands corresponding developments in the stock of human capital. For military organizations, this implies significant time and financial investments to develop the firm-specific human capital required, and any gap would be detrimental to the organization's overall mission readiness. A projected human capital competency index will also highlight areas of potential gaps and enable organizations to take corrective actions in advance.

b.   *Bench Strength*

The bench strength is a measure of the excess current stock of human capital. For military organizations, a good indicator would be the percentage of promotion-eligible officers and enlisted, who have yet to be promoted due to the availability of billets. This represents the percentage of the workforce who have acquired the human capital necessary to perform higher level jobs, but have yet to assume the work function due to availability. The bench strength index would be most effective when applied in a functional grouping.

A low bench strength index, coupled with a high human capital competency index, indicates efficiency and optimization. However, low bench strength also means that the organization may face difficulties in replacing workers who leave on short notice. Again, this is especially important for internal labor markets like the military. Low bench strength also reduces an organization's flexibility in forming and deploying highly qualified teams for ad-hoc projects and initiatives. Conversely, high bench strength indicates wasted resources and congestion in the upper echelons of the organization. Hence, management must decide on an appropriate level of bench strength that accommodates acceptable risks, considering the current and projected human capital competency index.

c.   Morale

Morale and satisfaction surveys are carried out regularly by military organizations to gauge the psychological health of the military force. The results from such surveys should be incorporated into the human capital preparedness index because of the proven linkage between satisfaction and performance. The morale of the workforce will affect the effort devoted to accomplishing the mission, regardless of the worker's competency level. The scores from such surveys, typically annual or bi-annual, should be weighted and periodically incorporated into the human capital preparedness index.

d.   Culture

The sustaining pillar of any organization is its culture. The culture determines how the organization will consistently react to the environment and adversity. Organizational climate and culture surveys are commonly administered by organizations to obtain information regarding their culture. Since the outputs from such surveys are typically qualitative, it may not be possible to incorporate them into the human capital preparedness index. Nevertheless, the outputs should still be considered when determining the level of human capital preparedness.

In summary, the manpower readiness index can be generated by combining the human capital competency and preparedness indices. Top management can also strategically decide on the weights to apply to the two component indices to reflect their current focus. Through the manpower readiness index, military organizations can make

strategic decisions based on their human capital status, and have a better grip on the trade-offs in the human capital when making decisions.

C. APPLYING THE MANPOWER READINESS INDEX IN THE NAVY'S HUMAN CAPITAL TRANSFORMATION

The most important application of the manpower readiness index is a performance measure for military organizations, where the bottom-line is non-financial. The manpower readiness index can be used to assess the impact of changes in the human resource management functions. This will allow military organizations to make the paradigm shift from personnel management to human capital management. As the Navy pushes ahead with her human capital transformation, there is a need to incorporate a performance measure, such as the manpower index, to track the progress and effectiveness. The manpower readiness index proposed in this thesis utilizes SkillsNET architecture to organize the detailed and objective job information obtained through the job analysis process; this information is a prerequisite for the manpower readiness index.

The Human Capital Content Model, shown in Figure 10, was proposed by SkillsNET to guide the Navy's human capital transformation efforts. To meet the strategic goals of the transformation, the Navy will need to apply the knowledge of SkillObjects^{TM} and critical work functions in all its initiatives and transformational efforts. The central idea to this model is the Human Capital Object, which is defined by SkillsNET as a multifaceted collection of work and workplace data content requirements, in a specific environment or set of environments, that support manpower, training and human systems integration analysis.

The human capital content model can also be used as the framework to develop strategic return on investment measures for human capital management. The manpower readiness index should first be employed when the job information has been aggregated to the human capital object level, and be used to evaluate the strategic decisions, interventions, and design. At the assignment level, the manpower readiness index can serve as a tool to assess the impact of implementing in all areas of transformation.

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Figure 10.   Human Capital Content Model (From Brief to Fleet Readiness Planning
        Session, SkillsNET, February, 2005)

Assets	Assemble	Aggregate	Assign

Assets

Work and Work Context Raw Data
"Lowest unit of work element"

Tasks and Sub-tasks
Knowledge
O*Net Skill
O*Net Ability
Tools
Resources

Navy
Data
Environment

Assemble

Skills & Context
"Lowest unit in context"

Work /
Work Context
Assets

Aggregate

Human Capital Object
"Final Specific Work Requirement"

An HCO is an multifaceted collection
of work and workplace data content
requirements in a specific environment
or set of environments, that will be
used to support manpower, training and
HSI analysis

Assign

Training

5VM

Position

WQSB

Mission

Manpower

Acquisition

Personnel

Detailing

Recruiting

Etc…….

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

1. Background

Theoretical and technological advances in human capital management has allowed military organizations to move beyond managing personnel by headcount and billets, to managing their workforces' knowledge, skills, abilities, and other characteristics. In a world of limited resources, managing by human capital provides avenues for greater synergies and optimization. One key aspect of human capital management is the choice of performance measures.

The lack of a financial bottom-line restricts the ability of military organizations to adopt all the best practices of commercial firms. The bottom-line for military organizations is force readiness, which is a measure of how prepared they are to accomplish the mission when called upon to do so. Over the years, military organizations have developed complex metrics to measure and track readiness in four areas of resources: personnel, supply, training, and equipment. Junor and Oi (1996) found that personnel quantity and quality are the only variables that consistently affected readiness in all the four areas. The essence of human capital management is recognizing the heterogeneity of labor; and this heterogeneity in effect determines personnel quality. Hence, the aim of this thesis is to propose a new approach to measuring manpower readiness through applying human capital management.

2. Adopting Human Capital Management

The first and most important step to human capital management is collecting and systematizing the detailed job information that describes the organization's stock of human capital. This process, known as the job analysis process, generates the information necessary to link job requirements to the organization's mission and strategy, and defines the knowledge, skills, abilities, and other characteristics needed in the workforce.

For the Navy's human capital transformation, SkillsNET Corporation has been contracted to conduct the job analysis process. SkillsNET organizes the job information

gathered in accordance with their proprietary SkillObjects™ framework. The job analysis process is currently ongoing for the Navy. This thesis provides a conceptual framework to develop a measure for readiness based on the job information generated through the job analysis process.

3.   Manpower Readiness Index

The manpower readiness index consists of two component indices: (1) the human capital competency index, and (2) the human capital preparedness index. The human capital competency index measures the current capacity of the workforce to accomplish the mission, which is defined in terms of job requirements for the workforce. This index captures immediate impacts on human capital, for example the drawdown of forces. On the other hand, the human capital preparedness index provides a forecast of the human capital readiness in the near future to assist in strategic decision making.

a.   Human Capital Competency Index

The proposed human capital competency index, shown as an example in this thesis, utilizes SkillsNET's SkillObject™ architecture. However the index's conceptual framework is generic in nature, and can be applied to any detailed job information, which is obtainable through job analysis processes and workforce assessments.

This thesis uses two critical measures to put the figures into the job information: (1) the weighting factor, and (2) the proficiency scale. To enhance objectivity, both measures are developed through job incumbent's feedback, verified and validated through co-workers and supervisors. The weighting factor reflects the relative importance of the components to the readiness, and is based on the workers' assessments of the work effort involved and its criticality. The proficiency scale measures the stock of human capital, and reflects the proficiency required by the job task or work function and the proficiency attained by the job incumbents. The proficiency scale should be progressive, to reflect the additional human capital gained as the worker learns through work experience and organizational training. The proficiency required for a more senior position of the same job function should be equal or greater than that for a junior one.

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b.   *Human Capital Preparedness Index*

The human capital preparedness index includes the following components: (1) projected human capital competency index, (2) bench strength index, (3) morale and satisfaction surveys, and (4) culture and attitudes surveys. When put together, these four components summarize the health of the organization's stock of human capital.

The projected human capital competency index forecasts the degree of fit between the organization's future stock of human capital and projected mission requirements. This knowledge enables organizations to plan ahead, acquire and develop the stock of human capital capable of meeting projected requirements, which is especially important for organizations with an internal labor market focus. The bench strength index indicates excesses in the current stock of human capital. Excesses are costly to the organization, but are necessary to a certain extent to respond to contingencies, like short-notice quits and problem solving project teams. One possible proxy for bench strength is the percentage of promotion-eligible workers who have yet to be promoted due to job availability.

Surveys for morale and satisfaction indicate the psychological health of an organization's human capital. These surveys, together with others for culture and attitudes, present management with an overview and feel for the character of the human capital. This character, which is also the spiritual foundation of the organization, will determine how the workforce will consistently react to changes in environment.

B.   RECOMMENDATIONS

To implement the conceptual framework of the manpower readiness index presented in this thesis, follow-on work is recommended in several areas:

1.   Verify and validate the job information gathered to ensure that it accurately reflects mission requirements. Based on the information, consider streamlining the organization to generate synergies.

2.   Conduct a workforce assessment to determine the current human capital capacity based on the verified job requirements.

3.   Develop, verify and validate the proficiency scale so that the points on the scale are criterion-referenced, i.e. able to accurately reflect the level of

proficiency required. The proficiency scale should account for gains in human capital from on-the-job experience. Comprehensive linkages between the proficiency scale and the training and promotion systems must also be developed.

4. Explore areas in human resource management where the manpower readiness index can be used as a performance measure. For example, using the index to measure the impact and effectiveness of assignment policies and systems to enable assignment decisions to reflect how they will affect human capital development in addition to the current job match.

5. Further studies are required to determine the relationship between general education qualifications, like high school diplomas, bachelors and masters degrees, and the enabling O*Net skills and abilities, under the SkillsNET framework. The results from these studies will enable military organizations to target their recruitment at potential service members with the required general human capital. Due to the internal labor market focus, studies to examine the relationship between general human capital, trainability and adaptability are also important.

LIST OF REFERENCES

Becker, Gary, Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education, *New York: National Bureau of Economic Research*, 1964.

Brown, Michael L., Human Capital Strategy – SkillObject[TM] Taxonomy and Human Capital Object Technical and Usability Brief, *SkillsNET Corporation*, Feb 2005.

Brown, Michael L., SkillsNET and SkillObjects[TM] Technology Brief, *SkillsNET Corporation*, Jul 2005.

Camuffo, Arnaldo, The Changing Nature of Internal Labor Markets, *Journal of Management and Governance*, 6: 281-294, 2002.

Department of Navy, Department of Navy Human Capital Strategy, Jun 2004.

Doeringer, Peter, and Piore, MichaelJ., Internal Labor Markets and Manpower Analysis, *Lexington*, *MA: Health*, 1971.

Fitz-enz, Jac, The ROI of Human Capital – Measuring the Economic Value of Employee Performance, *AMACOM*, 2000.

Harms, Alfred G. Jr., Hoewing, Gerald L., Totushek, John B., Sea Power 21 Series: Part VII – Sea Warrior Maximizing Human Capital, *United States Naval Institute*, *Proceedings*, Jun 2003, Vol. 129, Iss. 6, pg. 48.

Integrated Data Assurance Process (iDAP)
[http://www.navyskills.net/idap]

Junor, Laura J. and Oi, Jessica S., A New Approach to Modeling Ship Readiness, *Centre for Naval Analyses*, Apr 1996.

Kaplan, Robert S., and Norton, David P., The Balanced Scorecard, *Cambridge*, *Mass.: Harvard Business Press*, 1996.

Kerr, Clark, The Balkanization of Labor Markets, Labor Mobility and Economic Opportunity, *Cambridge*, *MA: MIT Press*, pp. 92-110, 1954.

Mincer, Jacob, Investment in Human Capital and Personal Income Distribution, *Journal of Political Economy*, 1958, 66(4):281-301.

Nalbantian, Haig R., Guzzo, Richard A, Kieffer, Dave, and Doherty, Jay, Play to Your Strengths – Managing Your Internal Labor Markets for Lasting Competitive Advantage, *McGraw-Hill*, 2004.

Osterman, P., Employment Structures within Firms, *British Journal of Industrial Relations*, 20(3): 349-361, 1982.

Schultz, Theodore, The Economic Value of Education, *New York: Columbia University Press*, 1963.

Sandall, Darrel, and Brown, Michael L., White Paper: Impact of Knowledge-Skill-Ability-Centric Capacity Measures on Strategic Planning for Training Intervention Decisions, *SkillsNET Corporation*, 2003.

SkillsNET Corporation, White Paper: Business Results through Workforce Development – Developing Workforce Competencies, Jul 2001.

Sobel, Irvin, Human Capital and Institutional Theories of the Labor Market: Rivals or Complements, *Journal of Economic Issues*, Vol. XVI, No. 1, Mar 1982.

Strange, Jill, Sandall, Darrel, and Brown, Michael L., SkillsNET Job Task Analysis and SkillObject Classification System Overview, *SkillsNET Corporation*, Sep 2003.

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